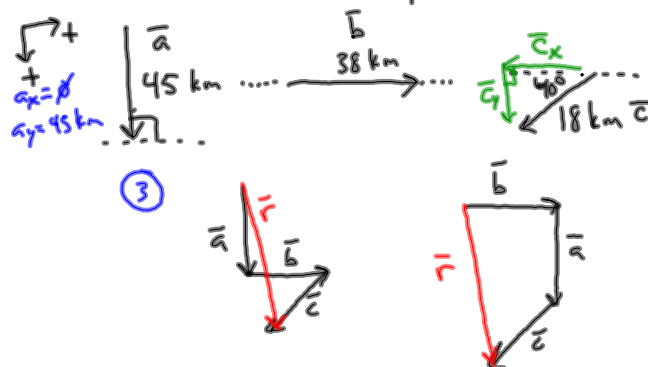


# Quiz on Vectors Tomorrow!

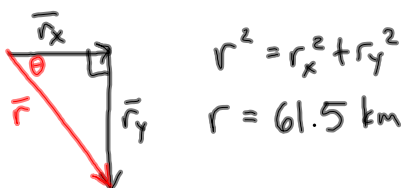
- Word problems
- Graphical and algebraic addition
- Breaking into components

A bird flies south for 45 km, turns and flies east for 38 km, and then flies south of west at  $40^\circ$  for 18 km. Find the total distance traveled and the displacement.



$$\begin{aligned}
 (2) \quad & a_x = 0 \text{ km} \\
 & b_x = 38 \text{ km} \\
 & + c_x = -(18 \text{ km}) \cos(40^\circ) = -13.79 \text{ km} \\
 \hline
 & r_x = 24.21 \text{ km}
 \end{aligned}$$

$$\begin{aligned}
 (2) \quad & a_y = 45 \text{ km} \\
 & b_y = 0 \text{ km} \\
 & + c_y = (18 \text{ km}) \sin(40^\circ) = 11.56 \text{ km} \\
 \hline
 & r_y = 56.56 \text{ km}
 \end{aligned}$$



$$\tan \theta = \frac{r_y}{r_x}$$

$$\theta = \tan^{-1}\left(\frac{r_y}{r_x}\right)$$

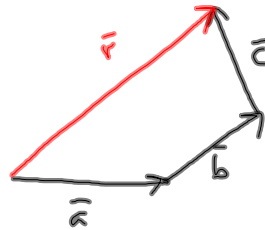
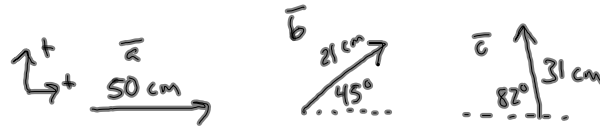
$$\theta = 66.8^\circ \quad (1)$$

$$\vec{r} = 61.5 \text{ km @ } 66.8^\circ \text{ S of E}$$

$$d = 45 \text{ km} + 38 \text{ km} + 18 \text{ km} = 101 \text{ km}$$

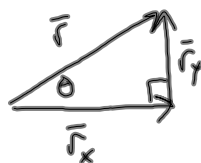
# Vector Practice and Graphs Notes 1.24.12 CP Physics

A ball rolls 50 cm to the right, 21 cm at  $45^\circ$  north of east, and 31 cm at  $82^\circ$  north of west. Find the ball's resultant displacement vector and total distance traveled.



$$\begin{aligned} a_x &= 50 \text{ cm} \\ b_x &= (21 \text{ cm}) \cos(45^\circ) = 14.84 \text{ cm} \\ + c_x &= -(31 \text{ cm}) \cos(82^\circ) = -4.3 \text{ cm} \\ \hline r_x &= 60.5 \text{ cm} \end{aligned}$$

$$\begin{aligned} a_y &= 0 \text{ cm} \\ b_y &= (21 \text{ cm}) \sin(45^\circ) = 14.81 \text{ cm} \\ + c_y &= (31 \text{ cm}) \sin(82^\circ) = 30.7 \text{ cm} \\ \hline r_y &= 45.54 \text{ cm} \end{aligned}$$



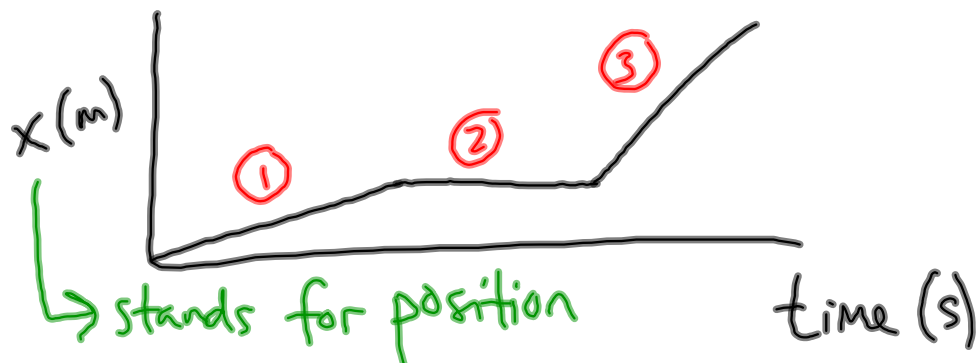
Pythagorean thm. to find  $r$   
 $r = 75.7 \text{ cm}$

$$\theta = \tan^{-1}\left(\frac{r_y}{r_x}\right) = 36.9^\circ$$

$$\vec{r} = 75.7 \text{ cm @ } 36.9^\circ \text{ N of E}$$

$$d = 50 \text{ cm} + 21 \text{ cm} + 31 \text{ cm} = 102 \text{ cm}$$

# Displacement v. time graphs



- look at slopes of various sections
- highest slope  $\rightarrow$  3
- slope of a v. t graph is object's VELOCITY
- $Velocity = \frac{displacement}{time}$   
\* a vector
- speed is scalar part of each velocity vector